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BIRD-BANDING

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CONTENTS

Page

STUDIES OF SWALLOWS BY THE BANDING METHOD. By *Seinosuke Uchida*. 1 Map and 1 Figure 1

COBB ISLAND. By *O. L. Austin, Jr.* 1 Map 12

NOTES ON PROTOCALLIPHORA DURING THE SUMMER OF 1931. By *Charles W. Johnson* 26

GENERAL NOTES.—Measurements of White-throated and Other Sparrows to Determine Sex, 30; Two Common Tern Recoveries on their Wintering Grounds, 31; More About Mallard No. 555414, 32; A Third Red-winged Blackbird Return S, 32; A Return 2 Baltimore Oriole, 32; The Number of Eggs Laid by the Vesper Sparrow, 33; An Interesting Great Horned Owl Capture, 33; Two Common Tern Returns and a Roseate Tern Recovery, 33; Additional History of White-breasted Nuthatch No. 56530, 34; Duration of Life of the Roseate Tern, 34; Song Sparrow Returns 3, 34; Starling, Barn Swallow and White-throated Sparrow Recoveries, 34; Two House Wren Returns-2S and a Mourning Dove Return-2S, 35; A Device for Applying Celluloid Bands, 35.

RECENT LITERATURE.—*The Riddle of Migration*, 35; *Der Vogelzug* Vol. II, No. 4, October, 1931, 36; *The Condor*, Vol. XXXIII, No. 6, Nov.-Dec. 1931, 37.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. III JANUARY, 1932 NO. 1

STUDIES OF SWALLOWS BY THE BANDING METHOD[1]

By DR. SEIKOSUKE UCHIDA

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IN view of the essential need of thorough knowledge of the habits of migratory birds, the Japanese government, which pays especial attention to the protection of wild birds, has been making minute investigations and collecting data on migratory birds by entrusting more than eighty schools, experiment stations, meteorological observatories, and lighthouse-keepers with the collection of the needed information for the solution of this important problem. Moreover, since 1924 the government itself has been carrying on bird-banding experiments with a view of contributing toward the solution of the same problem. The following list shows the number and species of birds banded by the Japanese government since that time:

In this report about swallows I will describe in detail the results of the banding experiments referred to in the above list.

There are three species of swallows migrating to Japan: *Hirundo rustica gutturalis* (Scopoli), Chimney Swallow; *Hirundo daurica nipalensis* (Hodgson), Mosque Swallow; *Hirundo javanica* (Sparm), Liu-kiu Swallow.

Of the above three species, the Liu-kiu Swallow inhabits only Loo Choo Archipelago, and thus is excluded from this report. As for the two other species, (see map) the former is the commoner in Japan, being distributed all over the country, whereas the latter principally inhabits the western part of the country, both nesting on the eaves or ceilings of human dwellings and godowns.

[1]The tabulated data of returns of banded swallows in my experiments I have already published in Japanese in a paper in *Chōjū Chōsa Hōkoku*, Vol. 6. I have therefore omitted them in this article, in order to avoid complexity, confining myself to describing only the results of the work.

Species of Birds	1924		1925		1926		1927		1928		1929		1930	
	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns
Night Heron	130	**8**	333	**23**	199	**1**	208	**3**	451	**24**	629	**18**	1040	**19**
Ducks (10 sps.)	380	**126**	704	**207**	1095	**125**	1747	**207**	1885	**242**	2553	**299**	1619	**324**
Quail			315	**7**	561	**9**	787	**6**	975	**55**	1211	**200**	1404	**229**
Charadriidae (7 sps.)	174	**7**	102	**1**	1		11		42		199	**2**	186	**10**
Water-Hen			199	**19**	9	**1**	57	**6**	68	**2**		**3**	36	**2**
Brown-eared Bulbul	10	**1**	5		7		3						1	
Dusky Ouzel	1070	**45**	1012	**5**	1046	**13**	1885	**16**	2332	**54**	1866	**57**	2154	**43**
Pale Thrush	220	**19**	231	**10**	368	**7**	183	**3**	345	**6**	355	**4**	373	**3**
Eye-browed Ouzel	103	**4**	327	**4**	119	**1**	184		286	**3**	281	**2**	481	**9**
Emberiziidae (17 sps.)	3880	**62**	4124	**41**	4461	**45**	7560	**64**	9229	**83**	9229	**192**	8657	**229**
Swallows	40		7		39		135		568	**17**	738	**63**	759	**65**

TABLE SHOWING NUMBER AND SPECIES OF BIRDS BANDED BY THE JAPANESE GOVERNMENT, 1924 TO 1930

The bands used for swallows in Japan, shown in Fig. 1 are usually of aluminum and are 12 mm. long and 5 mm. wide, weighing about 6 centigrams.

In Japan two methods of banding are in practical use: one to capture and band the birds while sleeping at night, and the other to capture and band them in the daytime by netting at the entrance and exit of their nesting houses as they go in and out.

To ascertain the sexes when banding some skill is needed, so far as the Chimney Swallow is concerned, for the distinction is rather difficult. In the main, however, the principal points of discrimination are as below:

(1) The female generally has a slightly shorter tail than the male. The length of tail: female, 70-85 mm., 77 mm. on the average; male, 81-100 mm., 88 mm. on the average.

(2) The cloaca of the female is large and oblong, while that of the male is small and slightly projected.

(3) As for the colors of the under tail-coverts, forehead, chin, and throat, those of the male are brighter and more beautiful than those of the female. However, the distinction is but faint in young birds.

(4) The strength of twittering notes.

(5) It is the female only that sits on the eggs.

Let me now show the banding results in the form of returns obtained for four years, 1927-1930. The two species of swallows banded during the above period totalled 2136, of which 124 returned. The localities where they were banded were the seven prefectures of Aomori, Akita, Saitama, Toyama, Hyogo, Hiroshima, and Fukuoka.

The banding of swallows is exclusively done at their nesting-places, and their returns were noted at the localities where they were banded. They never came back to nest in localities other than those where they were banded. Accordingly, it is to be understood that the returns are only those birds which returned to the localities of banding or nesting. The following table shows the results of banding swallows by species for the period above mentioned for each prefecture by years:

FIG. 1. ALUMINUM BANDS FOR SWALLOWS USED BY THE JAPANESE GOVERNMENT

1927

Species	Prefecture	No. Banded	Adults	Sexes	Nestlings	Returns	Sexes
H. rustica	Aomori	3	0		3		
H. rustica	Saitama	20	17	9 ♂ 8 ♀	3		
H. rustica[1]	Hyogo	26	2	1 ♂ 1 ♀	24		
H. daurica	Hiroshima	24	4	3 ♂ 1 ♀	20		
H. rustica	Fukuoka	20	7		13		
H. rustica		42	8		34		

TOTAL
135, Adults 38, 13 males, 10 females
Nestlings 97.

1928

H. rustica	Aomori	47	18	12 ♂ 6 ♀	29	13 ♂ 16 ♀	
H. rustica	Akita	17	1	♀	16		
	Saitama	188	104	52 ♂ 52 ♀	84	10	5 ♂ 5 ♀
H. rustica	Toyama	20	3	1 ♂ 2 ♀	17		
	Hyogo	223	23	11 ♂ 12 ♀	200	2	1 Nestling H.J.G. 1 ♂ H.D.N.
H. daurica					14		
	Hiroshima	39	22	12 ♂ 10 ♀	17	4	Ad. 4 1 ♂ 2 ♀
	Fukuoka	20	2	2 ♀	18	1	Adult

[1]Initial letters of the two species banded.

TOTAL
568, Adults 173, 88 males, 85 females.
14 Nestlings H.D.N.
Nestlings 381, 13 males, 16 females.
Returns 17, 15 Ad. H. rustica, 6 ♂, 7 ♀.
1 Ad. ♂ H. daurica.

1929

Species	Prefecture	No. Banded	Adults	Sexes	Nestlings	Returns	Sexes
H. rustica	Aomori	86	16	7 ♂ 9 ♀	70		
H. rustica	Akita	61	18		43	1 Adult	
H. rustica	Saitama	156	42	19 ♂ 23 ♀	114	53 Adults	28 ♂ 25 ♀
H. rustica	Toyama	30	12	7 ♂ 5 ♀	18	1 Adult	♀
H. rustica	Hyogo	194	79	38 ♂ 41 ♀	115		
H. daurica		106	47	23 ♂ 24 ♀	49		
H. rustica	Hiroshima	26	13	6 ♂ 7 ♀	13	8 Adults	5 ♂ 3 ♀
	Fukuoka	79	18	2 ♂ 16 ♀	61		

TOTAL
738, Adult H. rustica 168, 79 ♂, 101 ♀.
Nestlings 434.
Adult H. daurica 47, 23 ♂, 24 ♀.
Nestlings 59.
Returns 63. Adults 63, 34 ♂, 29 ♀.

1930

H. rustica	Akita	160	52		108	6 Adults		Remarks
H. rustica	Saitama	186	96	41 ♂ 55 ♀	90	20 Ads. 19 Nestlings 1	6 ♂ 13 ♀	
H. rustica	Toyama	20	14	6 ♂ 8 ♀	6	4 Adults	1 ♂ 3 ♀	
H. rustica	Hyoga	250	60	27 ♂ 33 ♀	190	7 4 Ads.	2 ♂, 2 ♀ H.J.G. 3 H.D.N.	2 adult, 1 ♂, 1 ♀, and 1 nestling
H. daurica	Hiroshima	30	8	5 ♂ 3 ♀	22	5 Ads.	1 ♂, 4 ♀	
H. rustica	Fukuoka	49	15	7 ♂ 8 ♀	32	2	2 ♂	
H. daurica		2	2	1 ♂ 1 ♀				

TOTAL
697, Adult H. rustica 239, 81 ♂, 104 ♀.
Nestlings 426.
Adult H. daurica 10, 6 ♂, 4 ♀.
Nestlings 22.
Returns 44. 41 H. rustica.
40 adults, 12 ♂, 22 ♀, 1 nestling.
3 H. daurica, 2 adults, 1 ♂, 1 ♀.
1 nestling.

SUMMARY

Total Birds Banded, 2136

Aomori Prefecture	Adult H. rustica	136. 34	(19 males and 15 females) and 102 nestlings.
Akita Prefecture	Adult H. rustica	238. 71	(1 female) and 167 nestlings.
Saitama Prefecture	Adult H. rustica	550. 259	(121 males and 138 females) and 291 nestlings.
Toyama Prefecture	Adult H. rustica	70. 29	(14 males and 15 females) and 41 nestlings.
Hyogo Prefecture	Adult H. rustica	867. 164	(77 males and 87 females) and 529 nestlings.
	Adult H. daurica	59	(31 males and 28 females) and 115 nestlings.
Hiroshima Prefecture	Adult H. rustica	85. 42	(18 males and 17 females) and 43 nestlings.
Fukuoka Prefecture	Adult H. rustica	190. 43	(7 males and 26 females) and 145 nestlings.
	Adult H. daurica	2	(1 male and 1 female).

Returns, 124. Of these, 120 were H. rustica adults, comprising 52 males and 57 females. Four were H. daurica, 3 adults and 1 nestling.

The percentage of returns of adult birds as shown in the foregoing table, is as follows:

Percentage of Returns of Adult Banded Swallows

	Banded One Year Ago				*Banded Two Years Ago*		
	1928	*1929*	*1930*	*Average*	*1929*	*1930*	*Average*
Akita		100	33	67			
Saitama	59	49	24	44	12	9	11
Toyama		33	33	33			
Hyogo	33		5	13			
Hiroshima	57	36	31	41		5	5
Fukuoka	13		11	8			
Total Average				34			8

According to the above table, the percentage of returns averages 34 in six prefectures. But as returns in Hyogo and Fukuoka Prefectures have been excepted for the reason that the investigation has been inadequate, the average percentage in the other four prefectures—Akita, Saitama, Toyama, and Hiroshima—amounts to 46. In other words, about one half of the adult swallows banded return to the neighbourhood of their nesting places of the preceding year. The death-rate of swallows is generally considered exceedingly high because of their long-distance migration. We may safely conclude, however, that most of them are, as a rule, in the habit of returning to their breeding places of the preceding year in view of the results obtained as shown in the above table.

MAP SHOWING DISTRIBUTION OF TWO SPECIES OF SWALLOWS IN JAPAN

When we consider the localities where the banded swallows returned, we find that almost all of them return to places within the limits of the villages or towns where they lived during the preceding year, the majority returning even to the same houses where they nested the preceding year. In fact, out of the 124 examples of returned birds, those which returned to nesting-houses other than the ones occupied the preceding year were only 31. Two of them nested next door to their nesting-houses of the preceding year. There were 8 examples of swallows which returned to the same village or town for three consecutive years, and 3 of them even nested at the same houses for three consecutive years. With regard to the 31 examples returning to houses other than their old ones of the preceding year, when observed more carefully, it has been found that most of them, in spite of having returned to the same houses once, lost their mates or were compelled to choose other houses, owing to the repair, or some other condition of their old houses. It may easily be seen that swallws tend strongly to return not only to the same localities but also to the same houses occupied during the preceding year.

It is a very interesting question why so few nestling swallows return to their old nests. My banding work so far has resulted in a very small number of such returns, consisting only of the following three examples:

No. 30413 Chimney Swallow.
One of the 114 nestling swallows banded at Shichiri-mura, Saitama Prefecture, August 9, 1929, returned to Noda-mura, an adjoining village in the same prefecture, May 28, 1930.

No. E-50 Chimney Swallow.
One of the 24 nestling swallows banded at Uozumi-mura, Hyogo Prefecture, July 29, 1927, returned to the same village, May 30, 1928.

No. 48391 Mosque Swallow.
One of the 59 nestling swallows banded at Chigusa-mura, Hyogo Prefecture, June 28, 1929, returned to the same village, July 17, 1930.

That returning nestlings are so remarkably scarce may be explained by the fact that they seek new breeding places the following year without returning to their old homes, or to the extremely high death-rate of swallows during the first year. Be the answer what it may, after repeated banding experiments, one finds that very few swallow nestlings return to their old breeding places the succeeding nesting season, as indicated by the following facts: In various localities where banding experiments have been made in Japan the number of swallows breed-

ing there year after year shows no noticeable increase or decrease. Generally speaking, almost the same number of nests is yearly found at the various houses. Now, as the number of returning parent swallows is 46 per cent, as already mentioned, it is only natural to conclude that the number of returning nestlings is the remaining 54 per cent. According to investigations made by Mr. Tominosuke Nibe (*Chôju Chôsa Hôkoku*, Vol. 2; pp. 55, 62 and 63,) a pair of parent swallows hatch 7.01 nestlings as an average brood; in other words, one swallow generates 3.5 nestlings. Now, putting the percentage of the returned nestlings at 54 per cent of that of parent birds, we come to the conclusion that these nestlings which return to their old breeding places comprise only 13.1 per cent, it being presumed that the remaining 87 per cent have died or sought new breeding places in other localities.

Swallows which have returned for two consecutive years are very few. In Saitama Prefecture only two returned by 1929 out of those banded in 1927; nine returned in 1930 out of those banded in 1928; in Hiroshima Prefecture only one in 1929 out of those banded in 1927; and only one in 1930 consecutively for two years out of those banded in 1928—thirteen in all.

There has been no return for three consecutive years so far. It should be noted, however, that banding has been carried out for only four years, and the number of birds banded has not been very large. Although birds returning for three consecutive years may likely be discovered in future, it is considered that such cases will occur very seldom, if at all.

In view of the above observations, it may safely be concluded that whereas the death-rate of swallows seems to be rather high until they reach the age of a year, the percentage of returns the following year is highest in case of adult birds, reaching about half of all the birds banded; that the number of returns of three-year-old swallows is less than for two-year-old birds; and that returns of four-year-olds are exceedingly rare. From these considerations it may be presumed that the average life of a swallow is under four years.

Let us now look into the question of permanent mating in the case of the swallow. Whether in the East or in the West, various popular views in connection with the question of bird-partnership have prevailed since times of yore. Most of the authors of these traditions seem to consider birds in general to be quite chaste such as the tradition widely believed in Japan regarding the Mandarin Duck. Nevertheless, according to observations made by S. P. Baldwin, a pioneer in researches in reference to

the mating of birds[1] the House Wren in the United States of America, contrary to popular conjecture, commonly changes its mate every breeding season, examples of continuing relations with the same mate for two breeding seasons being found exceptional. In the case of other species Mrs. M. M. Nice writes in her paper, "Do Birds Usually Change Mates For The Second Brood?",[2] that "in the case of seven pairs of [North American passerine birds] there was a shifting of mates in one season, while in twenty pairs of eleven species there was no change."

As to the permanence of the mating relation among Japanese swallows an examination of sixty-four pairs which were banded showed that twenty-six pairs returned to the same nest-houses in the same mating relation as in the preceding year; there were no examples of the same mates returning to nest-houses other than those occupied by the same pair the previous year; those returning to the same nest-houses as in the preceding year with different mates were six males, nine females, and three others of unknown sex; and, finally, those returning to nests other than the ones used the preceding year and changing their mates, numbered eight males, eleven females, and one of unknown sex.

If the new mates of the swallows in the above number are carefully examined, it is found that all of them are not banded, or were banded later than in the year in which their old mates were banded. In other words, there is nothing to prove that exchanges of mates were made between swallows which were banded in the same year. Therefore it may be supposed that they have sought new mates because their old mates died or did not return to their old breeding places. The fact that all those who did not change their mates returned to the same nest-houses as in the previous year, not to other houses, as pointed out above, is also noteworthy.

As for those which changed their mates, eighteen of them returned to the same nest-houses occupied in the preceding year, and twenty to houses other than in the preceding year. With reference to the latter, it is considered that they had most likely been forced to abandon their old nest-houses, being tempted by their new mates to the latters' old nest-houses.

Is there any recognizable difference between the male and the female in attachment to their old nest-houses? It has been proved that out of those swallows which have changed their mates from those of the preceding year when they were banded,

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[1] S. P. Baldwin: The Marriage Relation of the House Wren, *Troglodytes ædon ædon*, *Auk*, Vol. XXXVIII, pp. 227-244, 1921.
[2] *Bird-Banding*, Vol. I; pp. 70-72, 1930.

those which returned to the same houses as in the previous year were five males and nine females, whereas those which returned to houses other than in the previous year, that is, those which may be considered to have been lured by their new mates, were eight males and eleven females. It is interesting to note that, in the cases both of those which returned to their previous houses and of those which returned to other houses than in the preceding year, the number of females was larger than that of the males. Judging from this result, it may be considered proved that the degree of attachment of swallows to their old nest-houses does not necessarily depend upon the sex.

As may be inferred from the above-enumerated facts, the swallow has a persistent homing habit; not merely does it return precisely to the locality where it nested in the previous year, but it is usual that the bird returns even to the same nest-house as in the preceding year. Consequently, a swallow ought to meet the same mate in the same nest-house as in the previous year, and naturally both of them nest and breed there, renewing their marriage relation.

However, in case of either the male or the female having died, the survivor may be compelled to seek a new mate, because of being unable to find its previous mate, in spite of returning to its old nest-house.

Of the male and female swallows which were banded after their sexes were ascertained, there are only five birds which nested for three consecutive years: three of them changed their mates in the third year, while the remaining two continued with the same partners for three consecutive years.

There has so far been only one instance of a banded Japanese swallow being recaptured in its hibernating[1] place. The record is important because it is unique so far as Japan is concerned. Place of banding, Notomura Hiki-gun Saitama Prefecture, (The middle part of the mainland of Japan). Date of banding, July 1, 1926. Place where it was recaptured, Lagna State, Luzon, Philippine Islands. Date of recapture, October 26, 1926.

[1] In using the word "hibernating," Dr. Uchida doubtless has in mind our English word "wintering."

In his discussion of the two species of Japanese swallows he appears to treat both of them as a single species in writing of his returns. This, however, does not invalidate any of his conclusions since the number of *uipalensis* returns is negligible (3 out of 124), the conclusions having to do mainly with *gutturalis*.—EDITOR.

COBB ISLAND

By O. L. AUSTIN, JR.

DURING the last three decades Cobb Island and its seabird rookeries have become more or less a tradition among ornithologists. Although the general impression held by those who have never been there is slightly distorted and exaggerated, this reputation is not entirely undeserved. Naturally the region is no longer the avian paradise it was during the middle of the nineteenth century, before the plume-hunters and market gunners started their deadly and despicable work. But, thanks to the efforts of the Audubon Society, certain species still breed there plentifully, and in much larger numbers than they did thirty years ago.

The accompanying map affords a clearer conception of the size and shape of the island and its environs than any word picture that might be painted. Cobb Island itself is a narrow sand-spit five miles long, forming a link in the chain of ever-changing barrier sand beaches lying off the Virginia and Carolina coasts. Between it and the mainland eight miles away is a shallow sound known as the "Broadwater" in which there are numerous marshy islets, some of only a few acres, others of several square miles in extent most of which support extensive rookeries of marsh-nesting species. Hence, while not strictly a part of Cobb Island proper these islands form with it a single, homogeneous regional entity, which must be considered as such in any survey of avian conditions in the district.

The pertinent history of Cobb Island goes back almost a century. It was about 1840 that Nathan Cobb left Eastham, Cape Cod, Massachusetts, in his schooner to trade along the Virginia Capes. W. H. Fisher (*Osprey*, Vol. I, No. 8, April, 1897, p. 107) says he

> "was so struck with the surrounding country that on his return home he had a small frame house built, placed it on the deck of his schooner, and returning to Northampton County he set it on the mainland opposite to Cobb's Island and opened a store to trade with the surrounding people. After he had been located there for some time, one day a small colored girl was sent down to make a purchase, but returning with empty hands, 'Missus,' she said, 'there am no store down on the shore,' and when her mistress went down to see about it herself she found it to be a fact. Old Nathan had purchased Cobb's Island, paying therefor $20 in cash and 100 bushels of salt. Then building himself a raft he floated his house out to his newly acquired domain."

COBB ISLAND
AND VICINITY
NORTHAMPTON COUNTY, VIRGINIA
Atlantic Ocean
COBB ISLAND
MAINLAND
CEDAR
ISLAND
GULL
MARSH
BIG
EASTMARD
LITTLE
EASTMARD
CARDWELL'S I
Coast Guard Station
WRECK
ISLAND
H06
ISLAND
Oyster
Salt Marsh
Sand Beach
N
S
E
W
1
2
3
4
5
Scale of miles

The island has ever since born his name, and the greater part of it is still owned by his descendants. It appears on maps and charts as "Cobb Island," but it is *frequently* referred to in literature in the possessive case.

When "Old Nathan" settled there, the island was possibly seven miles long, two miles longer than it is now. It was likewise much wider, especially at the southern end, where its width is reported to have been almost a half-mile. The soil produced excellent crops. Cabbages that would fill a bushel basket, mammoth tomatoes, turnips as big as watermelons, and squashes a man couldn't lift are still talked of by the elder Cobbs. There were trees on the island—maples and poplars planted about the lower end and scrubby cedars farther up. Live-stock throve, and cattle, pigs, sheep, and poultry were raised, all of which was made possible by the existence of two artesian wells at the southern end, where the Cobb farm was located.

From all accounts the place teemed with birds. Ducks and shorebirds abounded during the flight seasons, as well as gulls, terns, and rails at nesting time. Between the markets for gamebirds and eggs in Philadelphia and New York and the steady demand for plumes by the millinery trade, an excellent living could be derived from the *res naturae* in the vicinity alone.

Nathan and his sons lived for years on the produce of the farm and the bountiful gifts nature showered at their door. They sold a strip of land at the lower end to the United States government, upon which a Coast Guard station was established about 1876. From then until the turn of the century the island was in its heyday. Originally a paradise for pot-hunters and sportsmen, as the game dwindled it next became a famous summer resort. According to Fisher (*idem*),

> "[Nathan] and others built and opened a hotel, in which part of the lumber used was drift and wreckage picked up on the beach. This finally passed through several hands, and is now [1897] controlled by a syndicate from Lynchburg, Va., which paid $20,000 for the hotel, some cottages, and 25 acres of ground, some five years ago."

Practically all the buildings were clustered around the artesian wells on the southern end of the island. This being before motor craft had come into general use, most of the traffic with the mainland was done with sail-boats, which, being dependent on the wind and weather, were very uncertain. Nevertheless, people came from near and far to enjoy the hunting, the egging, the fishing, and the bathing, and the place prospered.

The bird life, which had already begun to disappear, now dropped off alarmingly, owing mainly to the efforts of the

eggers and the plume-hunters. The Royal and Caspian Terns were extirpated, and the Least Tern was brought to the verge of local extinction. The other terns, the Skimmer, and the Laughing Gull dwindled in numbers until but few were left, and the Oyster-catcher and the Willet almost disappeared. It was about this time that the Audubon Society started its good work, and legal protection was given the birds. Also, the birds were aided tremendously by a series of winter gales of unusual intensity which in 1896 destroyed the greater part of the southern end of the island.

In the *Baltimore Sun* for October 19, 1896, appears the following account of the disaster:—

"After quite an adventurous trip *The Sun's* correspondent succeeded in reaching Cobb's Island yesterday by means of a small sailboat, in company with several other visitors. . . . Our boat was the first one to carry a party to the island since the storm, and as yet the seas in the vicinity of Cobb's Island are running so very high that it is really perilous for a boat of small dimensions to attempt the trip.

"We found about twenty persons on the island, including the members of the life-saving station, all of whom were in a very sorrowful mood on account of the almost entire distruction of the island and the property thereon. One of the most prominent citizens of the island took his loss in the most philosophical manner. He believes that this, as well as the previous storms encountered on the island during the past few years, is only Divine warning for them to vacate the island entirely and he thought it would not be long before Cobb's Island would be many feet under the surface of the broad Atlantic ocean. While only a few of the houses were washed entirely away, all of them suffered more or less damage. The water was fully a foot deep over the entire island, and the seas which rolled were from 40 to 50 feet in height.

"The Baltimore Cottage . . . which was previous to the storm seventy-five yards from the beach, is now a total wreck being pounded to pieces by the immense seas which swept the island. Several other cottages were about half buried in the sand. . . . The hotel is a complete wreck. . . . About three feet of sand stands in the dancing pavillion on the first floor. The bar room, billiard room, bowling alley and several other small buildings were tumbled down in one heap and broken up so they were of no use whatever. There are several wells of fresh water now covered by the ocean that were previous to the storm in the barnyard of Mr. Cobb, used for watering his stock."

The relentless, never-ceasing forces of erosion have left their mark. The pounding sea has worn the island down in some places, and built up additions to it in others. Successive storms, after the main disaster, razed the rest of the buildings, with the exception of two cottages, in the center of the island, belonging to the Cobbs, and the Coast Guard station (it was the Life-Saving station in those days) which had fortunately been moved back from the shore the preceding summer. Where the old farm and the hotel buildings were situated back in the 90's the main channel

now connects the Broadwater with the ocean. And Pig Island, which used to lie a half-mile northward of Cobb Island, is now a part of it.

The island never recovered entirely from the initial blow, but the Cobbs are a hardy stock, and are not to be discouraged by a little thing like a flood. They built one of their remaining cottages into a new hotel, raising it up on piles so that high water could not flood the lower floors, and resusciated the old business. Many of their old visitors returned, and some new ones, but the trade dwindled steadily until 1930, when, as a final catastrophe the building burned to the ground, leaving besides the Coast Guard station but one solitary "cottage on stilts," the last remnant of the island's past glory. Here George Cobb, one of Nathan's grandsons, still spends most of his time. He is "fixin' it up" so that he may soon board a few summer visitors again.

Even though the Cobb Island settlement failed, economically speaking, the near-by rookeries continued to suffer. Egging was allowed all the spring up to July 4th by Virginia law until the signing of the International Migratory Bird Treaty in 1916. The habits of years are hard to break, and the commercial fishermen still kept up their regular practice of egging whenever they chose, despite the law. Natives from the mainland continued to visit the island to gather messes of young gulls for the pot, and to shoot all manner of birds out of season. So the Audubon Society had George Cobb appointed a Deputy United States Game Protector, and employ him as such during the nesting season to patrol the rookeries.

The easiest way to reach Cobb Island is to drive by automobile to the little town of Oyster, which lies about five miles north of Cape Charles, in Northampton County, Virginia. Here one may hire a motor-boat to transport him the eight miles to the island—a passage which, with the crafts available, usually requires at least two hours. The rookeries cannot be worked satisfactorily from the mainland, as too much time is consumed daily in reaching them. Much more efficient results may be attained by living on Cobb Island and working the colonies from there. The main difficulty to be encountered in the living conditions on the island to-day is the lack of good drinking water. The only fresh water to be found there is rain-water caught off the roofs and stored in large iron tanks. It is neither palatable nor good for the digestion. Sea food is plentiful—there are clams and oysters to be had for the gathering, crabs in abundance, and pan-fish for the catching—but it is necessary to take staples with one from the mainland.

My wife and I left Oyster with George Cobb on June 23d and spent two delightful and profitable weeks with him in his cottage on the island. It is difficult to imagine how we could have accomplished our aims without the assistance of "Cap'n George." The fortunes of the island have been his for over sixty years, but his hale and youthful appearance belies his age. A kindly and temperate man (as are most who have lived close to the elements) he is proud that he now has an active part in preserving the birds, for as a boy he saw the extirpation of the Royal and Least Terns by the plume-hunters, and he has witnessed every subsequent stage of the battle for survival waged by the avian inhabitants of the region he loves. The shallow Broadwater was his primer; the intricacies of its narrow, tortuous channels and the vagaries of its tides and currents are to him an open book. We spent every day afield with him, making the rounds of the rookeries in his shallow-draft scow with its "one lung" motor. Nor did a day pass that his intimate knowledge of the region and the birds did not prove invaluable to our investigations.

The Cobb Island rookeries may be divided into two groups—first the beach colonies, and second the marsh colonies. In the beach colonies nest Black Skimmers, Common Terns, Gull-billed Terns, Least Terns, Wilson's Plovers, Oyster-catchers, and Willets. In the marsh colonies are Laughing Gulls, Forster's Terns, and Clapper Rails. The first to which we turned our attentions were the beach colonies, of which there are two on Cobb Island itself and a third on Cardwell's Island, a small, recently formed sand-bar at the southwestern corner of Cobb Island, from which it is separated by a narrow strait a hundred yards wide. The largest of these three colonies is spread over a mile and a half of beach at the extreme northern end of Cobb Island, on what used to be Pig Island. I estimated it to contain:—

Black Skimmer	600 pairs
Common Tern	150 "
Gull-billed Tern	20 "
Least Tern	20 "
Willet	2 "
Oyster-catcher	1 "
Wilson's Plover	3 "

The Cardwell Island colony is next in size. It occupies a quarter-mile of the beach on the southern side of the island, and as it is only a short way from the Cobb cottage, we spent more time on it than on any of the other beach colonies. It contained:—

Black Skimmer	300 pairs
Common Tern	27 "
Gull-billed Tern	4 "
Least Tern	18 "
Wilson's Plover	2 "
Oyster-catcher	2 "

The third rookery is on the outer beach of Cobb Island about two miles from the southern end. It is scattered along a mile front, with the various species inhabiting it more or less grouping themselves together in little colonies within it. Its inhabitants were:—

Black Skimmer	125 Pairs
Common Tern	20 "
Gull-billed Tern	2 "
Least Tern	40 "
Wilson's Plover	3 "
Oyster-catcher	1 "
Willet	2 "

There is one other sizeable colony of beach-nesting birds in the vicinity, on Wreck Island, several miles south of Cobb Island. I did not have an opportunity to visit it, but according to Cap'n George it is about the size of the Cardwell Island rookery.

Each of these colonies is located similarly on the flat, open, sandy, shell-littered beach, above the limit of normal summer tides, usually on the stretches washed clean of débris by winter gales. It is difficult to advance any reason for the selection of the sites, for, were there birds enough, it seems as if the whole stretch of beach should be inhabited. The localities selected for rookeries cannot be differentiated by any criteria visible to the human eye from the miles of empty shore adjoining them. There is certainly food enough in the vicinity to support many times the present population, and since the birds are to be observed fishing in all the near-by waters, the proximity of an adequate supply of it to adjacent unoccupied portions of the beach is probable. Hence the closeness of food in this case is evidently not a factor in site-selection.

It is possible to attain a high degree of efficiency in banding young Skimmers and terns, for they are out in the open where it is easy to find them. During my preliminary survey of the beach colonies on June 24th and 25th incubation was just being completed. The young began to hatch in numbers two days

later, and July 5th found the majority of them large enough for banding. In the Cardwell Island rookery that day we banded fully ninety per cent of all the young available, which exhausted our supply of the No. 4 bands we were using on Skimmers. Our totals there are as follows:—

Gull-billed Tern	1
Common Tern	31
Least Tern	14
Black Skimmer	550

If one were to return to the island another season, and planned to cover all these colonies, on the four rookeries it should be possible to band at least 1500 Black Skimmers, possibly 2000 in a good year, and perhaps 500 terns of the three species, 1000 if one is fortunate and diligent. If it were not for the Skimmers, however, the numbers of beach-nesting birds that might be banded would hardly repay the operator for the time that must be spent in accomplishing it. What really makes banding operations in the region worth while is the birds in the marsh colonies, but it would be rather senseless not to band what of the beach-nesting birds are available while one is in the vicinity.

The marsh rookeries on the islands in the Broadwater will repay a visit from every standpoint. Here Laughing Gulls, Forster's Terns, and Clapper Rails nest in large numbers. Most of the islands, which are merely large mud-banks held together against the poundings of the winter storms by a thick cover of sedges, project barely above the level of the water during normal high tides, and many of them are completely flooded during lunar inundations. Next to depredations by man, these monthly high courses of tides are the birds' worst hazard. If they occur with westerly winds or during calm weather, little damage is done beyond the loss of a few nestlings devoured by the crabs which follow the tide up into the grass. But should an easterly gale accompany them, the rookeries are likely to be wiped out. A high wind from this quarter not only piles the water shoreward to an even greater height, but creates a choppy sea which sweeps through the grass, dislodges all the nests, and carries them with their contents out into deep water to their destruction.

So shallow is the water in the immediate vicinity of these islands, however, that at half tide they are surrounded by miles of soft, sticky mud-flats into which one sinks knee deep and over which progress is well-nigh impossible. No channels approach nearer than a quarter-mile to the rookeries, and it is hence impossible to reach them even with a light skiff except when the water is high enough to cover the intervening flats.

The day's work must be mapped out accordingly. When low tide occurs during the middle of the day, one can land on the islands early in the morning, stay throughout the ebb, and leave late in the afternoon. Otherwise one must visit them over the high tide, landing on the flood, and leaving on the ebb, which allows about five hours for work at best. It requires careful planning and an intimate acquaintance with local conditions to be able to utilize one's time to the best advantage.

I estimated the population of the principal marsh colonies to be as follows:—

Little Eastward Island

Laughing Gull	1200 pairs
Forster's Tern	52 "
Clapper Rail	22 "

(actual count, probably many overlooked)

Big Eastward Island

Laughing Gull	1500 pairs
Forster's Tern	5 "
Clapper Rail	38 "

(actual count, probably many overlooked)

Gull Marsh Island

Laughing Gull	4000 pairs
Forster's Tern	30 "
Clapper Rail	?

(many—in same proportion as on other rookeries, but no count made)

Cedar Island

Laughing Gull	500 pairs
Forster's Tern	350 "

(in two colonies)

Clapper Rail	?

(many—no estimate made)

There are from five to twenty-five pairs of Laughing Gulls to the acre in the main rookeries, the degree of concentration varying in proportion to the thickness and the height of the sedges. The nests are bulky structures of eel-grass and seaweed matted on top of the sedges, which must be thick enough when tramped down to support the nest off the ground and high enough to afford hiding-places for the young. The nests will float in the event of unusually high water, but, the higher they are built, the less risk they incur of being flooded by the lunar tides.

The Laughing Gulls commenced to hatch June 24th, and the ensuing week saw most of the young emerge. They usually remain in the nest during their first two days in the outside world, but at this time their tarsi are too small to hold the No. 5 band required for the adult. As they grow they acquire rapidly a measure of caution, so that when they have attained banding

size, they leave the nest at the first sign of danger to hide in the vegetation near by. However, until their flight feathers are well-developed, some three weeks after hatching, they seldom stray more than fifteen or twenty feet from the nest, and it is not particularly difficult to locate them. My method was simply to search in ever widening circles through the sedges around each nest until I located the two or three youngsters belonging to it. They frequently hide close to the crude pathway worn down one side of the nest out into the sedges, and I soon became proficient at finding them. My daily "catch" increased from two hundred when I started to five hundred before I finished. (The work is not the cleanest in the world—the birds' legs are always coated with sticky mud, which immediately transfers itself to the hands and thence to the trousers. It is well to wear clothes which may be washed easily in salt water.)

On July 6th we were forced to suspend our operations because of lack of bands. Although we had gone over only one third of the rookeries, and had handled probably 60 per cent of the young in the area covered, we banded 2600 young gulls. There were still a considerable portion of young too small to work with and many eggs unhatched. I judge the most propitious time for banding on the marsh rookeries should be the two weeks commencing July 4th. I believe two men working systematically through this period could band ten thousand Laughing Gulls.

The abundance and distribution of Forster's Tern during the breeding season depends largely on the availability of nesting sites for it. The species invariably deposits its eggs in shallow depressions in the thick mats of seaweed, particularly eel-grass, marooned atop the sedges by the high spring tides. I found small colonies of them scattered here and there throughout the rookeries wherever the vagaries of wind and tide during the preceding months had left the requisite carpet of *Zostera*. Their breeding is evidently considerably later than that of the Laughing Gulls surrounding them, for most of the eggs were just commencing to hatch on July 6th, the day of our departure. The nests are so scattered, and the young so difficult to locate after they leave the nest (a day or so after hatching), that I doubt whether more than five hundred individuals could be banded on the rookeries in any one season, even under optimum conditions.

The habits of Forster's Tern are markedly different from those of the closely related Common Tern. The whiter plumage and paler bill of the former are readily distinguishable in the field when light conditions are favorable, but the two species can be told apart most easily by their alarm notes. The familiar cry of the Common Tern against invaders is a rasping descending

Observers (See Bibliography)	1875 Bailey	1880 Ridgway	1892 Pearson	1901 Kirkwood (in Dutcher)	1902 Andrews (in Dutcher)	1902 Chapman	1903 Andrews (in Dutcher)	1907 Bent	1909 Howell	1930 Hadley	1931 Austin
Laughing Gull	Most abundant		Common	About 1000	About 4000	Several hundred		Abundant	2000	Many hundreds	1200 pairs
Gull-billed Tern			Mentioned	About 1000	About 300	16		4 pairs	16	A few	26 pairs
Caspian Tern		A few	0	0	0	0		0	0	0	0
Royal Tern	A few	1000 pairs	0	0	0	0		0	0	0	0
Forster's Tern	A few (Had not begun to nest)		Considerable number		About 600 (Incl. Common)	Small number		A few (200 prs. on Wreck Isl.)	0	Small colony	437 pairs
Common Tern	Very common		Considerable number	About 200	About 600 (Incl. Forster's)	Several hundred		200 pairs	300	Had not begun to rest	200 pairs
Least Tern	Colonies of 50 pairs a mile apart all along the beach		One seen					0	0	A few	78 pairs
Black Skimmer	Flocks seen (Had not begun to nest)		Large number	About 4000	About 4000	Thousands	New Colony of 1000	Large numbers	300	Many hundreds	1025 pairs
Clapper Rail	Abundant		Considerable number		About 2000			Abundant	Abundant	Common	Common
Willet	Large numbers		5 pairs	2 pairs	4 pairs	2		2	4		4 pairs
Wilson's Plover	12 pairs		Not uncommon	2 pairs	2 pairs	2	30	4	0		8 pairs
Oyster-catcher	6 pairs		Several pairs	12 pairs	4 pairs	2		4	0		4 pairs

TABLE GIVING ESTIMATES OF BIRD POPULATION OF COBB ISLAND, 1875 TO 1931

tecarr. That of Forster's Tern is much weaker and softer, and holds its pitch. These "marsh terns" are much shyer and wilder on the breeding grounds that their better-known relatives, and when their territory is invaded by the bander they circle high overhead, well out of gun-range. I have scarcely ever worked in colonies of Common, Arctic, or Roseate Terns without being pecked on the head by the enraged adults, but never once, even where the nests were most abundant, did a Forster's Tern venture even to swoop at me.

It is difficult to estimate the number of Clapper Rails now breeding in the Cobb Island region with any degree of accuracy. Nests are constantly encountered in all the rookeries, frequently built close to the gull nests, and in one case within five feet of a colony of Forster's Tern. But they are so well camouflaged and hard to find that one can never be sure that all of them have been counted. Nevertheless, judging by the descriptions in literature of past conditions, the Clapper Rails do not seem to me to be as numerous as they were two decades ago.

In about half the nests at the time of our visit the large clutches (of five to fourteen eggs each) were still being incubated. Those in the other nests had evidently hatched, but so secretive and well able to hide in the grass are the chicks, that we saw but two broods of young, of which we were able to capture and band only eight. As yet, of course, there has been devised no system whereby *Rallidæ* may be captured in large enough quantities to make special efforts to band them worth while.

The accompanying table is based on the estimates of all the investigators who have visited the island in the past and recorded their findings in literature. The percentage of error in it is large, and it hardly gives a fair picture, for not only does the time of year the various censuses were made vary by as much as six weeks in some instances, but in very few cases did the authors trouble to make an actual count of the birds they observed, especially in the more abundant species. Statements such as "abundant," "many hundreds," "a few," or "not uncommon" are of very questionable value for comparison. It is likewise unfortunate that there is no way of allowing for the idiosyncrasies of individual observers, no two of whom ever see the same number of birds in the same place at the same time (compare, for instance, the two columns for 1902). Nevertheless the table affords us, inaccurate and vague as it is, as good an estimate of the variations and fluctuations of the avian population in the region as it is possible to obtain. It is self-explanatory, but it illustrates several things worthy of note.

Two species, the Royal Tern and the Caspian Tern, never

TABLE GIVING ESTIMATES OF BIRD POPULATION OF COBB ISLAND, 1875 TO 1931

reappeared after their extirpation fifty years ago. The Least Tern, however, which was totally absent from the region from 1892 until sometime after 1909, has made an excellent comeback. The Laughing Gull has reacted splendidly to protection, and is now more abundant than it has been since 1875. The Black Skimmer is holding its own, and perhaps increasing slightly, as are the Gull-billed, Common, and Forster's Terns. The Oyster-catcher and the Wilson's Plover are hardly less common than they ever were, but the Willet has never recovered entirely from the persecution it received during the latter part of the nineteenth century.

There are some depredations still committed in the rookeries. The commercial fishermen are as fond of sea-birds' eggs and young gulls as they ever were, and they have become even more disrespectful of the law in recent years. It is next to impossible for one warden to patrol the many miles of rookeries efficiently, but conditions are so much better than they have been in the past two-score of years, that nothing but the highest praise can be given to those responsible for the improvement, notably the National Association of Audubon Societies. One wonders how long it will be before the islands will have returned to their natural state and conditions there will approximate those of the days before man upset the balance.

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NOTES ON PROTOCALLIPHORA DURING THE SUMMER OF 1931

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THE work of Mr. William P. Wharton of Groton, Massachusetts, on the method of combating the injury done to nestling birds by the blood-sucking maggots of Protocalliphora by removing the original nest after the birds are several days old and substituting a hand-made one proves most interesting. The following is a list of the nests Mr. Wharton sent to me, with his notes, to which I have added what the nests actually contained.

June 12. Bluebird. "The original nest was removed after the young were four days old." The very young maggots failed to pupate.

June 20. Tree Swallow. "Nest removed in a similar manner to that of the Bluebird." This nest when examined contained 37 puparia from which 37 flies of *Protocalliphora sialia* emerged.

June 25. Bluebird. "Original nest removed." Only one small puparium and fly of *P. sialia*.

June 25. Barn Swallow. "Nest removed after the young had fallen from it and died." The dead birds were sent with the nest. After removing the birds all that I obtained from the nest was a number of the two scavenger flies, popularly known as "blue bottles," *Calliphora viridescens* and *Lucilia sericata*.

June 26. Robin. "Inside portion of the nest removed when maggots were noticed in it, after the young birds had left." From seven puparia emerged seven *P. sialia*.

June 29. Bluebird. "Nest substituted by me for that removed on June 12th. The young left apparently in good condition." In the nest were 34 puparia, 18 of which were parasitised by the little chalcid *Mormoniella vitripennis*, Walk. (*brevicornis* Ashm.)

June 29. Song Sparrow. "The nest was collected after the young birds had apparently left prematurely, one having been found dead beneath the nest." From the puparia emerged 4 males and one female, referable to *Protocalliphora splendida* Macq. The males more closely resemble those of *P. sialia* than any I have seen, but the terminal segment of the abdomen is a bright green, not blue.

July 1. Tree Swallow. "The young birds were in good condition when removed from the nest." The nest was placed in

a glass jar, and the puparia were noticed a little later to be heavily parasitized. An examination of the nest September 11th showed that only 3 flies had emerged; 46 of the puparia had the little exit holes of the chalcid *Mormoniella vitripennis*, and three were apparently dead. One of the latter puparia was, however, broken open, and I was surprised to find in it the larvæ of a parasite much larger than those of the chalcid, which had appeared between the 15th and 20th of July. Evidently we have another parasite of Protocalliphora that possibly passes the winter in the puparium of the fly. I am guarding them carefully but doubt if I can raise them now that the puparium is broken. I am now saving all supposed dead puparia, hoping for some results.

July 10. Tree Swallow. "The replaced nest of the above brood, the young apparently all having flown but one, which was dead." The nest contained 34 maggots, 9 larvæ, and 3 puparia, which were preserved in alcohol. From the other puparia emerged 14 flies of which 2 were parasitized and 4 were dead.

July 2. Tree Swallow. "This is also a replaced nest. Two of the young birds died, three having probably flown." The nest contained 38 puparia, 34 of which were parasitized by the little chalcid *Mormoniella*. This is another remarkably high percentage of parasitism. In the nest of July 1st there was over 91 per cent, while in this one it is over 96 per cent.

July 16. House Wren. "The young birds had probably left the nest in good condition." The nest contained 22 puparia; 17 flies emerged and 5 were dead.

July 16. Starling. The large nest was alive with mites when received. The nest was examined September 11th and contained 69 puparia. Fifty flies had emerged; 8 were dead and 11 had been destroyed by some predaceous insect, a large irregular hole having been made on the side of the puparium. There were also present numerous puparia and flies of the "Little Housefly" (*Fannia canicularis*), "Meal worm" (*Tenebrio obscurus*), the Cadelle (*Tenebroides mauritanicus*), a little moth, *Monopis irrorella*, etc., all acting as scavengers in the filthy nest.

July 28. Barn Swallow. "The young had jumped out of the nest onto the floor and were saved." The nest contained 42 puparia; 26 flies emerged; 16 were parasitized and 6 were dead.

August 1. House Wren. The nest contained no puparia of Protocalliphora.

Mr. A. W. Higgins of Rock, Massachusetts, sent a Bluebird's nest and under date of July 8th says: "The nest belongs to the

second clutch of eggs: the first nest was destroyed by a male House Sparrow. The nest was taken July 2d, and the four young birds were alive. I counted 119 maggots and pupæ in the nests." The nest was put in a jar when received, but evidently a few of the maggots escaped in transit, for I find only 109 puparia, from which emerged 51 flies; 13 were parasitized and 45 were dead. Mr. Higgins also sent a Tree Swallow's nest, which he said had contained one dead bird and one alive, which left the nest June 29th. The nest contained 21 puparia and 21 flies emerged.

On May 16th Mr. Paul A. Stewart of Leetonia, Ohio, sent me the nest of a Starling, from which 92 *Protocalliphora sialia* emerged early in June. Mr. Stewart writes: "The young birds in the nest were not dead but apparently healthy. Probably the infestation was not sufficiently heavy to destroy the six young the nest contained." If 92 large blood-sucking maggots failed to have any effect on the young Starlings, I think that it throws some light on the situation in New England where the Starlings have been so prevalent for several years. I have suggested before that the Starlings probably have something to do with the apparent increase of Protocalliphora in this section, and as I continue this work I feel more convinced that this is the case. Our native birds cannot compete with this more vigorous intruder.

On August 1st Mr. Stewart sent the nest of a Bluebird with the following note: "The young Bluebirds in the nest were in an entirely healthy condition. Ten maggots have been removed from the nest and preserved. I would appreciate very much if you will send me the number of adult flies produced by the maggots." There were 64 puparia, from which emerged 51 flies; there were also 13 small undeveloped larvæ. None of the puparia were parasitized, quite unusual for this time of the year.

Mr. Wendell P. Smith of Wells River, Vermont, in sending a Bluebird's nest taken May 27th says: "Four young birds died in the nest during the 25th and 26th. I noticed larvæ, about one eighth of an inch in length, of a drab color." A few of the larvæ pupated, but most of them were too young to transform.

On July 2d Mr. O. L. Austin, Austin Ornithological Research Station, South Wellfleet, Massachusetts, sent ten nests of the Tree Swallow. It was something of a surprise when an examination failed to show a single Protocalliphora. Fleas and mites were abundant in some of the nests. Is Protocalliphora absent on Cape Cod?

The contents from a Downy Woodpeckers nest from Holderness, New Hampshire, were received from Mrs. R. B. Harding.

July 6th, consisting of a putrid mass containing numerous muscid larvæ which I failed to raise. Several *Fannia canicularis*, however, did emerge.

The results of the year are interesting in many ways. Mr. Wharton has proved that the first nest can be successfully removed and a handmade nest substituted, thus relieving the very young birds from a large number of the blood-sucking maggots, and thereby saving many of the birds, for it is when the birds are very young that the greatest injury is probably done. This also conclusively shows that there is comparatively little parasitism of the fly in the first brood, and that all of those nests should be destroyed as soon as the birds leave and the houses should be thoroughly cleaned. It is also gratifying to see the large percentage of parasitism in some of the second-brood nests. These nests should not be destroyed until a month or two after the birds have left thus giving the chalcid parasites a chance to develop.

GENERAL NOTES

Measurements of White-throated and Other Sparrows to Determine Sex.—Thanks to the suggestion of Mr. William G. Fargo of the Museum of Zoölogy, Ann Arbor, Michigan, that the sex of Song Sparrows could often be determined by measurements of the wing and tail, all birds that I have trapped this fall have been thus measured, with most interesting results. It proved easy to distinguish the sex of sixty-two out of sixty-six White-throated Sparrows (*Zonotrichia albicollis*), of three Lincoln's Sparrows (*Melospiza lincolni lincolni*), of one Tree Sparrow (*Spizella arborea arborea*), and of the majority of the sixty Juncos (*Junco hyemalis hyemalis*) and seventy-nine Song Sparrows (*Melospiza melodia beata*).

The measurements in millimeters of the White-throats were as follows, the average being in parentheses:

30 males, wing, 73-76.5 (75.1); tail, 70.5-77 (73.8)
36 females, wing, 66-73 (70.3); tail, 66-73 (69.7)

With four birds the wings measured 73mm.; one was considered a male because he weighed 25.7g., two were considered females because of weights of 21 and 22.5g., while the fourth, with a weight of 24g., was rather doubtfully assigned to the female ranks. (All of these birds were caught in the early morning.)

In dealing with weights of birds, the individuals must be classified according to sex and also as to the time of day they are captured, as the following table shows:

Average Weight in Grams of White-throated Sparrows, Sept. 26 to Nov. 8, 1931.

Sex	No. of Birds	7-8 A. M.	No. of Birds	9 A. M.-3 P. M.	No. of Birds	4-6 P. M.
♂	22	25.9	13	26.3	9	26.7
♀	34	23.9	15	25.2	2	23.7

The range of weights for early-morning captures varied with males from 23.2g. to 28.5g; for females from 21g. to 27.3g. Later in the day males varied from 23.5 to 30g.; females from 22.6 to 27.8g.

The data on the Lincoln's and Tree Sparrows were as follows:

Lincoln's Sparrow, ♂ Oct. 3, 7.20 A. M. Wing 64mm., tail 58mm.; weight 18.8g.
♀ Oct 3, 7.20 A. M. Wing 61mm., tail 57mm.; weight 17.0g.
♀ Oct. 17, 8.00 A. M. Wing 61mm., tail 57mm.; weight 17.5g.
Tree Sparrow, ♀ Dec 6, 8.30 A. M. Wing 70mm., tail 64mm.; weight 16.5g.

With both Juncos and Song Sparrows the majority of birds have been clearly male or female according to wing measurements, but a number in both species cannot be placed without further experience. Juncos need to be carefully studied as to plumage differences, including the amount of white on the tail-feathers. I am finding a number that look like males but measure like females, and one of these, collected by a cat, proved to be a female.

As to the Song Sparrows I call all those with wing measurements of 63mm. females, all those with 66 to 70mm. males (and this has been corroborated in ten cases by the singing of the individuals), but those with wings of 65mm. I hesitate to assign one way or another at present. It may well be that some are males and others females, and that tail measurements and weights (the fall males have averaged 1.8g. heavier than the females) will help in the problem. But I shall know much more about Song Sparrow measurements after I have trapped the nesting adults next spring.

Since the majority of bird books do not give the wing and tail measurements of the two sexes, I will quote from Ridgway's "Birds of North and Middle America" (1901, *Bull. U. S. Nat. Mus.* 50. Part 1) as to the four most common winter sparrows.

Junco, Male: wing 76.71-82.30 (79.25); tail, 63.25-71.12 (66.55).
Female: wing, 70.61-78.23 (74.93); tail, 62.23-67.06 (64.26).
Tree Sparrow, Male: wing, 74.17-77.47 (75.95); tail, 64.01-69.60 (66.29).
Female: wing, 69.85-78.74 (72.64); tail, 64.26-68.83 (65.79).
White-throat, Male: wing, 72.39-77.22 (74.68); tail, 71.12-76.20 (73.15).
Female: wing, 69.60-73.15 (71.12); tail, 68.07-73.66 (69.60).
Song Sparrow, Male: wing, 63.25-72.14 (67.31); tail, 61.98-70.87 (66.80).
Female: wing, 61.47-71.37 (65.02); tail, 55.63-70.36 (63.75).

With Tree and Song Sparrows the measurements of the two sexes greatly overlap. It seems probable that any one bander would find his birds much more homogeneous than the scattered specimens that Ridgway dealt with. For instance his seventy-eight Song Sparrows (*M. m. melodia*) now divided into four subspecies, varied from 61 to 72mm. in wing measurement, whereas my sixty-seven birds (the moulters were omitted) varied between 63 and 70mm.

For measuring, dividers and a millimeter rule are necessary. (A celluloid rule proved quite inaccurate.) It is wise to make several trials on each bird. Ridgway explains the methods as follows: "Wing, measured with dividers, one point resting against the anterior side of the bend the other touching the extremity of the longest primary. Tail, measured with dividers, one point of which is inserted between the shafts of the middle pair of rectrices at the base and pressed forward as far as they will go without splitting the integument, the other point touching the extremity of the longest rectrix."

To recapitulate, let me say that in trying to determine the sex of these Sparrows I depend primarily on wing measurement, using Ridgway as a guide. Where this measurement is intermediate between the two sexes, either the tail measurement or the weight, or both, may help in a decision, or the sex may have to be left in doubt. With Juncos general darkness of plumage cannot be depended on as always indicating males, nor with White-throats does general dinginess necessarily mean a female, for in this species I found no sex differences in plumage except that no female showed the very brightest coloring.—MARGARET M. NICE, Columbus, Ohio.

Two Common Tern Recoveries on their Wintering Grounds.—From approximately four hundred and fifty chicks of the Common Tern (*Sterna hirundo*) banded last year on the small islands at the mouth of the Kennebec River in Maine I have to date received two returns. One, No. 364220, banded July 11, 1930, on Lower Sugar Loaf Island, was reported shot by E. Gama at Brighton, Trinidad, B. W. I., during the month of March, 1931. The second, No. 340920, banded July 5, 1930, on Upper Sugar Loaf Island was found dead by "Doc." Henry at Cayenne, French Guiana, on May 31, 1931. Unfortunately I have no information as to how long this second bird had been dead. Should it be determined that it had been dead but a short time, as was probably the case, the record would serve as another indication that the Common Tern does not carry out its full migration the second, non-breeding year. Mr. Frederick C. Lincoln of the Biological Survey informs me that there are several return records for the Common Tern as well as the Caspian Tern for the summer months from this same general area. It is possible, then, that this particular bird would have spent the summer on the South American coast had not death intervened.—OLIN S. PETTINGILL, JR., Cornell University, Ithaca, New York.

More About Mallard No. 555414.—Mallard number 555414 seems to lead a charmed life and she has been responsible for a substantial increase of her kind.

For the benefit of those who have not followed the history of this bird, originally banded November 29, 1927, at Antioch, Nebraska, by F. J. Keller, the following brief summary is given:[1] First return, March 12, 1928; second return, March 10, 1929. In each of the three seasons already reported upon, this bird selected as her nesting site a box placed on the roof of a barn on the game refuge of Mr. Keller.

In the autumn of 1929 she went south with her offspring and associates, again escaped unscathed through the shooting season, and was recaptured by Mr. Keller at the home station on March 11, 1930. She again nested in her box on the barn roof and on May 10th, nine of her thirteen eggs successfully hatched. On July 18, 1930, her second setting of eggs hatched, the family again numbering nine.

The almost clocklike precision with which this bird returned (March 12, 1928, March 10, 1929, and March 11, 1930) was broken in 1931, as it was not until April 9th that she was taken by Mr. Keller. However, by April 13th the nest on the barn roof held four eggs. Under date of September 22d, Mr. Keller advised the Biological Survey that she still had with her twelve young birds.

For five consecutive years this bird has successfully run the gantlet of shooters and returned to nest again in her unusual site. The record is remarkable as it stands, but it is hoped that this interesting bird may be spared for several years to come and that she will add still other returns to the series already at hand.—Frederick C. Lincoln, Biological Survey, Washington, D. C.

A Third Red-winged Blackbird Return-S.—In *Bird-Banding*, Vol. II, p. 185, I recorded a second return-S Red-winged Blackbird[2] banded by William P. Wharton at Groton, Massachusetts. The first record of this sort was reported, as stated, by Laurence B. Fletcher at Cohasset, Massachusetts. A letter recently received from Mr. Wharton states that he has secured still another return-S of this species at Groton on May 28, 1931, a bird banded May 25, 1930. Records of this kind continue to indicate that there are few if any migrants which fail to return to nest at or near their former nesting place, and to a less extent the records to date appear also to indicate that the young return to their approximate place of birth, an example of which was first recorded by Audubon in the case of Phœbes.—C. L. Whittle.

A Return-2 Baltimore Oriole.—Using string and yarn in an open-top Chardonneret trap as bait, we banded an adult female Baltimore Oriole (*Icterus galbula*) No. 641732, on May 20, 1929. Using nesting material in 1930 and 1931, this bird was a return-1 May 16, 1930, and a return-2 May 22, 1931. The bird nested very near the same place for the three successive years, though the exact spot is not known. In the spring of 1930, using a shallow bath in a pull-string trap as bait, we banded six adult Orioles, four being females. During May and June, 1931, we caught six more adults of this species, using the same trap, and as before four were females.—A. Milliken, Brooks School, North Andover, Massachusetts.

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[1] For full details up to and including 1929, see *Bul. Northeastern Bird-Banding Assoc.*, Vol. V, no. 3, pp. 92-94, July, 1929.

[2] This record was incorrectly credited to Summerville, South Carolina, instead of Groton, Massachusetts.

The Number of Eggs Laid by the Vesper Sparrow—In his interesting paper on "Some Notes on the Breeding of the Vesper Sparrow" in *Bird-Banding* for October, Mr. Lincoln Bryant, Jr., refers to the statement of authorities that the minimum laying of eggs for the Vesper Sparrow is four, the maximum six. This certainly does not agree with my experience with these birds.

I have examined at various times somewhere between fifty and a hundred nests of the Vesper Sparrow. Most of these were in Ontario County, New York, a few were in Bergen and Sussex Counties, New Jersey, in New Brunswick, Canada, and elsewhere. I have never yet seen an indication of the Vesper Sparrow laying over four eggs, and three, particularly as a second set for the season, are quite as common as four. I have noted a number of instances where there was nothing to indicate that the bird ever laid more than two eggs which she was incubating.—B. S. Bowdish, Demarest, New Jersey.

An Interesting Great Horned Owl Capture.—While returning from tending a duck trap on the Walter P. Chrysler estate at Horn's Point on the Choptank River, Maryland, just after dark on the evening of October 7, 1931, I flushed a Great Horned Owl, which fluttered up in front of my car and flew laboriously down the road. The headlights showed it to be carrying something heavy, something which it could not lift two feet off the ground. I gave chase, and the bird dropped clumsily a hundred yards farther on, to crouch defensively atop the prey it seemed so loath to leave. I stopped the car twenty feet away and turned on my strong spotlight. The owl's attention was riveted by the dazzling beam, and while it stood motionless staring into the glare, I crept up cautiously on the dark side, threw my jacket over it, and pinioned it down. After wrapping the claws in my handkerchief to prevent accidents, and folding the bird safely in my jacket, I stooped to pick up its prey, which, to my surprise (and delight) proved to be a half-grown house cat! The kill evidently had just been made, for the limp body was still warm and quivering.

The owl weighed forty ounces, and from its small size I judged it to be a male. The cat weighed nineteen ounces, almost half as much as its captor.

I banded the bird and released it next morning on the shore of Cambridge Harbor. It flew out over the water and alighted on one of the launches at anchor nearby. Immediately the Laughing Gulls gathered from near and far, and in a few moments eighty of them screamed, cackled, and chattered in a white cloud above the ruffled owl. They harried it, crow fashion, for five minutes, until the subject of their wrath flapped lazily to the opposite shore and disappeared in the shelter of the trees.—O. L. Austin, Jr., Bureau of Biological Survey, Cambridge, Maryland.

Two Common Tern Returns and a Roseate Tern Recovery.—During 1930 we banded 763 Common Terns on Greater Weepecket Island, lying near Naushon Island in Buzzard's Bay. The adult Terns we banded nested in two areas, a stretch of open shore and a higher inland area covered with bushes. In 1931 two returns were recaptured which were nesting on the same areas they had nested in during 1930. The dates are: A347420, banded on nest July 1, 1930, a return taken on its nest June 15, 1931; and A347494, banded on nest July 10, 1930, a return taken on nest June 15, 1931.

A Roseate Tern A343200 (immature), banded July 4, 1929, was shot at Lamaline, on the southern coast of Newfoundland, July 28, 1931.—Mrs. Ethel M. Crowell, 4 Maple Street, Franklin, Massachusetts.

Additional History of White-breasted Nuthatch No. 56530.—In the *Bulletin*, Vol. IV, 1928, pages 29 and 100, and in *Bird-Banding*, Vol. I, 1930, page 83, was recorded the then known history of a male White-breasted Nuthatch, No. 56530, banded May 14, 1923, by Mrs. R. G. Caughey of Antrim, New Hampshire, which in 1930 was at least seven and a half years old. Mrs. Caughey now reports that this bird continued to visit her station up to October, 1931, so he is now at least eight and a half years old.—C. L. Whittle.

Duration of Life of the Roseate Tern.[1]—On July 7, 1931, a Roseate Tern (*Sterna dougalli*) bearing band number 403063 was found dead on Egg Island in Lewis Bay near Hyannis, Cape Cod, Massachusetts, by a member of the staff of the Austin Ornithological Research Station. This bird had been banded when a chick by Mr. Charles B. Floyd at Tern Island, Chatham, Cape Cod, Massachusetts, July 8, 1926. So far as it has been possible to ascertain, this age record of five years constitutes the longest duration of life proved for an individual of this species.—Oliver L. Austin, M.D.

Song Sparrow Returns-3.—Song Sparrow No. 174410 (band changed in 1931 to No. B119586), banded on December 7, 1926, a return-1 on August 16, 1929, a return-2 on October 20, 1930, a return-3 on March 16, 1931.

Song Sparrow No. 578824, banded December 11, 1927, a return-1 on October 10, 1928, a return-2 on June 3, 1929, and a return-3 on March 5, 1931.

Song Sparrow No. 174448 (band changed in 1931 to No. B119584), banded on October 13, 1927, returned on March 19, 1929, a return-2 on March 4, 1930, and a return-3 on March 12, 1931.

Song Sparrow No. 611688, banded on March 31, 1928, returned on April 2, 1929, a return-2 on March 2, 1930, and a return-3 on May 1, 1931.

Song Sparrow No. 611696, banded on May 2, 1928, returned on March 3, 1929, a return-2 on May 15, 1930, and a return-3 on March 7, 1931.

Note the different periods of the year in which No. 174410 and No. 578824 were captured, and that though one was banded a year later than the other, the periods of capture are similar with one exception.

The last three have now been breeding here for four consecutive years. No. 174448 remained during the winter following its first capture and also the spring and summer of 1928.—Raymond J. Middleton, Norristown, Pa.

Starling, Barn Swallow, and White-throated Sparrow Recoveries.—Starling No. A200521, an adult banded on November 20, 1928, was killed in Palatka, Florida, by Mr. A. Crabtree in December, 1930. This

[1]Contribution No. 5 from the Austin Ornithological Research Station.

bird was apparently a winter resident of Norristown when banded and yet two years later had migrated to Florida to winter.

A Barn Swallow, No. 7535, banded as a nestling on June 28, 1924, was found dead two miles from place of banding on May 26, 1926.

White-throated Sparrow No. A100232, an adult, banded during migration on October 8, 1928, was trapped by Mr. James McGreal at Manchester, New Hampshire, on April 29, 1930.—RAYMOND J. MIDDLETON, Norristown, Pa.

Two House Wren Returns-2S and A Mourning Dove Return-1S.—House Wren No. B13914, banded on July 20, 1928 as an adult, returned on April 26, 1929 and was a return-2S on April 28, 1930.

House Wren No. B74505, an adult when banded on June 6, 1929, returned on June 15, 1930, and was return-2S on May 24, 1931.

Mourning Dove No. 283230, banded March 27, 1926, returned June 19, 1930. This bird was at least five years of age at the time of its recapture.—RAYMOND J. MIDDLETON, Norristown, Pa.

A Device for Applying Celluloid Bands—As the Bureau of Biological Survey has sent me a supply of colored celluloid bands, and, no doubt, others have also obtained a supply, the problem of applying them to birds' tarsi is open for suggestions. A makeshift device for applying the small bands is not difficult to make and is fairly satisfactory. To make this device take a pair of steel dividers and wind a good-sized pure rubber band tightly around one of the arms close to their junction, so that they are held open say a fourth of an inch. To apply the band, pinch the points together and place them in the band, holding it with the slit downward. Then by releasing the pressure on the arms they will open the band so that it may be easily placed on the bird's tarsus.—C. L. WHITTLE.

RECENT LITERATURE

The Riddle of Migration.—By William Rowan. Published by Williams & Wilkins Co., Baltimore. In the introduction to this interesting little volume Dr. Rowan states that there are two avenues by which to approach the problems involved in the migrations of birds. "Field observations and speculations based thereon exist in sufficient volume to fill a library, but few and far between are the attempts of the technically trained biologist —the anatomist, biochemist, biophysicist, physiologist, etc.,—to apply his special knowledge to the problem." And he says of his book: "If it convinces the ornithologist that the laboratory and microscope may prove real adjuncts to a solution of the problems of migration and if it encourages him to continue more enthusiastically than ever in the collection of facts and in analysis of the field aspects, it will have achieved its object."

Following the delightfully written word-pictures of his Prologue, Dr. Rowan gives forty pages to the bird, its anatomy and physiology. Then follow interesting chapters on "Environment, Past and Present," "The Evolution of Migrations," and "Annual Migrations." The various theories as to the cause of migration and the stimuli governing it, are discussed, and Dr. Rowan describes his extensive experiments with captive Juncos and Crows, and other birds on the effect of light in causing structural and physiological changes in the living birds. By the use of artificial lighting he subjected birds in fall and early winter to light con-

ditions similar to those of spring, and studied these birds later both in the field and on the dissecting table. His conclusions are most interesting.

Birds which were subjected to an artificially controlled daily increase in light conditions, with a corresponding increase in physical activity and in time devoted to feeding, showed both anatomically and physiologically, reactions such as are expected in the spring of the year, though the experiments were carried on in the autumn. These birds sang as in spring, courted and mated, and when released from captivity, apparently migrated. Dissection showed their gonads were enlarged as in spring. Control birds, on the other hand, subjected to normal light, food and exercise, showed no such changes in either structure or actions from what is normal at that season.

The book should be read by all bird-banders and others interested in the movements of our feathered neighbors.—J. B. M.

Der Vogelzug. Vol. 2, No. 4, October 1931. The first paper in this number is on the migrations of Siberian ducks, by Werner Rüppell, based on return records of birds banded while wintering in India. Seven species of ducks are discussed. His data suggest that the birds wintering in India breed to the east of the Ural Mountains and chiefly to the west of the Yenesei River.

Holst contributes a paper to the discussion of bird flight and head winds, two papers on which appeared in the preceding number (one by Drost and one by Geyr von Schweppenburg). He concludes from an examination of published data that the apparent preference for flight against the prevailing wind (that is, directly into head winds) is not a matter of purely physical or mechanical factors, but that in cases where flight is exclusively against head winds or with side winds that some other still unknown factor may play a part. This factor, evidence for the existence of which is based on negative rather than positive data, is assumed to be probably of a "psychophysical" sort. The reviewer cannot see any advantage in this assumption.

Franz Groebbels writes on further observations on the body temperature of migrant birds caught at lighthouses. (The author had previously published two papers on this subject—one in the *Verh. Ornith. Gesellschaft Bayern*, Vol. 18, 1924, p. 44-74, and one in the *Zeitschrift f. vergl. Physiologie*, Vol. 12, 1930, p. 682). He gives data on a number of species, which, together with previously compiled information, lead him to the conclusion that birds migrating by night are in a weaker condition as far as their own chemical temperature regulation is concerned. Jerky, sudden movements tend to increase the body temperature, which is not constant, but varies with the changes in the external thermal conditions. This lack of stability is a very noteworthy physiological fact, especially since these birds are able to draw upon a very rich supply of body fuel. The livers of a number of migrating larks were examined histologically and were found to be swollen with fat and glycogen, both of which are heat-producing foods. The author refrains from attempting to explain these anomalous observations and is continuing his researches, the results of which will be of decided interest.

Fabricius and Tåning contribute the first of a projected series of papers on bird-banding work in Denmark. They give some return records of the European Avocet, Godwit, Oyster-catcher, and Sandwich Tern, banded as young birds at the Danish bird reservation "Tipperne." Of the 1560 young Avocets banded, six were retaken in Portugal and one in France; of 55 Godwits banded, one was recaptured in Portugal and one in Italy; of 65 Oyster-catchers banded, one was recovered in

Holland; while of 268 Sandwich Terns, one was retaken in Schleswig-Holstein and one other in South West Africa.

Among the shorter notes are several of interest. Dobbrick finds that the Turnstone (*Arenaria interpres interpres*) is a regular migrant in eastern Neufähr. Heinroth raises the question as to why ducks often breed in regions distant from their birthplaces. He finds that a perusal of published banding returns reveals many cases of British birds breeding in Russia, Icelandic ones nesting in Sweden, etc. He suggests as a partial explanation the idea that inasmuch as ducks winter in flocks gathered originally from many areas by the aggregation of migrants in common wintering grounds, and furthermore, inasmuch as the birds frequently pair off before starting their migrations, it is not at all inconceivable that a British-reared individual may mate with a Russian one, and that one influences the other more than does the hypothetical "call" of the birthplace, so that one of the pair eventually comes to breed in a locality far removed from its original home. This would seem to hold especially for year-old birds that have never made a spring migration to their birthplaces. Heinroth also suggests that species that mate on their breeding grounds presumably would tend more to developing an extensive year-round range, and less to the production of local races. Bouma and Koch report that more than four thousand Starlings have been banded at the Sempach station in Holland. An unusual record of longevity in a wild bird is a nineteen-year-old Oyster-catcher, originally banded as a young bird on July 9, 1912, and retaken on June 11, 1931. Two European Herring Gulls, twenty-one and twenty-two years old respectively, are reported by Schüz.—H. F.

The Condor. Volume XXXIII, No. 6, Nov.-Dec., 1931. The first article in this issue is entitled "Banding Canada Geese in Califorina in 1931" and is by James Moffitt of San Francisco. Canada Geese (*Branta canadensis canadensis*) breed in considerable numbers in northeastern California, and an attempt was made to capture adult geese during the flightless period incident to the summer moult, as well as full-grown juveniles. Though the methods employed in capturing the birds were not entirely successful, some interesting experience was gained. Very little definite information was available as to the date of the flightless period; the adult birds proved very skilful in concealing themselves, and it was found that not all adults were flightless at one and the same time. An attempt to drive the geese into a long funnel-shaped net proved unsuccessful. Catching birds from a boat gave almost the same result, only one bird being so taken. Then an automobile was pressed into service, and after the running geese were closely approached, the banders jumped from the car and the geese were quickly run down and captured. A total of forty-five birds was banded, including thirty-five juveniles and only ten adults. Captured birds were, as might be expected, badly frightened as well as exhausted, and the method hardly recommends itself to general use. A number of the banded birds died soon after their release, and though the cause of death is unknown, it was thought possible that death resulted from releasing the birds in water while they were overheated from their efforts to elude the banders.

Thousands of geese are killed annually in northern Siberia by means of organized drives during the flightless period. The *National Geographic Magazine* for December, 1924, describes a Siberian "goose drive" wherein fifteen men captured (and killed) fully four thousand five hundred geese, after driving them into large circular traps made of nets supported on

poles. The present article indicates that a properly planned "drive" might furnish excellent results in quantity banding, but it calls for the coöperation of quite a number of banding enthusiasts.

The second article in this issue is on "Some Flocking Habits of the Crowned Sparrows" and is by John B. Price of Stanford University. Several hundred Golden-crowned Sparrows (*Zonotrichia coronata*) and Puget Sound White-crowned Sparrows (*Zonotrichia l. pugetensis*) have been banded since 1925 on the college campus, and not only have many repeats and returns of banded birds been recorded, but an extensive series of sight identifications has followed the use of conspicuously placed areas of artificial coloring-matter on the feathers of captured birds. The results show clearly that both the species studied "spend the winter on the Stanford University campus in definite flocks each with its own range of about 15 to 20 acres, and there is very little changing of individual birds from one flock to another." Though these species migrate annually to a northern breeding area, "in most cases an individual bird returns to its original flock territory after migration." A typographical slip on page 242 refers to "Puget Sound Golden-crowned Sparrows" in error for White-crowned Sparrows.—J. B. M.

After reading this important paper by Mr. Price, one cannot help feeling regret that all the bird-banders making up the four regional associations do not, as a matter of course, receive a copy. This applies also to all published matter supplying ornithological information secured by banding and related methods of research. This article is of particular importance at this time as it answers the question often asked by banders operating small stations: "How can I hope to accomplish anything of importance compared to the results of such large research stations as those operated by Baldwin and the Austins?" Surely there are many aspects of ornithology that can be studied with profit by small operators, and no better illustration of this has come to my attention than the study of the distribution of the Golden-crowned Sparrow and the Puget Sound White-crowned Sparrow while on their wintering grounds.

The paper is a fine beginning toward what it is hoped in time will be complete histories of such wintering groups. Among other things we need to know why, (1) these species were each in several flocks instead of in a single flock made up of each species; (2) in what order did the birds comprising the wintering groups arrive from their nesting grounds; (3) in what order did the wintering groups leave for their nesting grounds; and (4) where do the birds comprising the groups nest, what is their distribution on their nesting grounds and during their migration to and from their nesting and wintering grounds?—C. L. W.

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